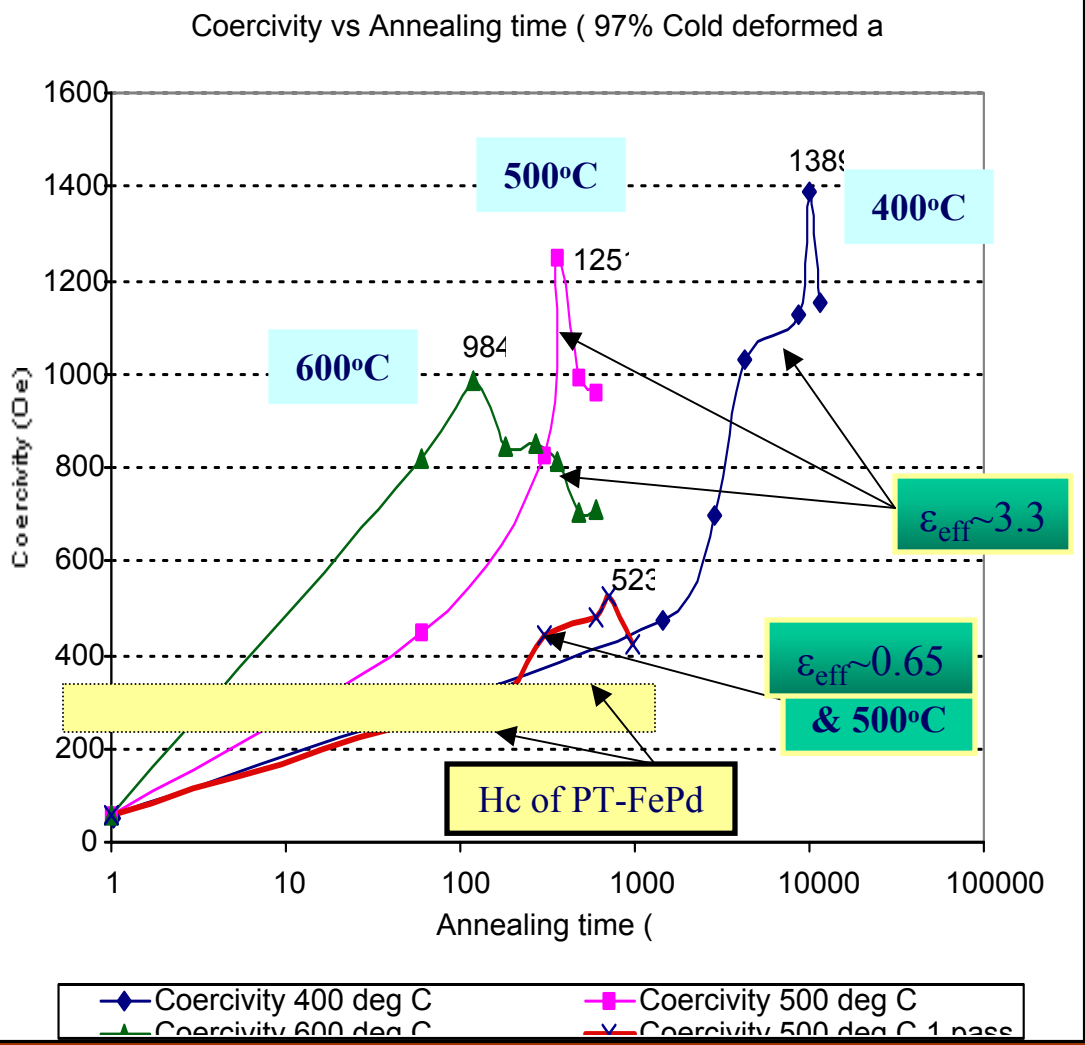
CAREER: Nanostructured Intermetallic Alloys - Annealing Behavior, Microstructural Control and Influence of Scale in Reversibly Ordering Systems

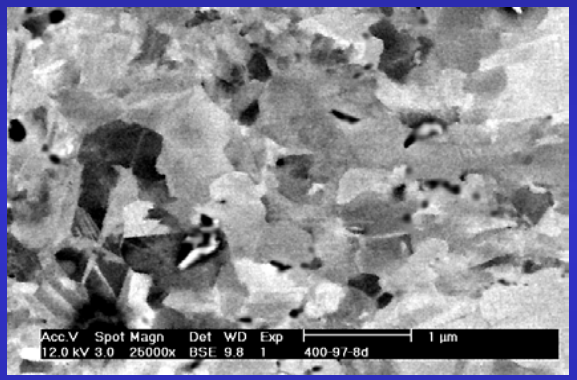
Jörg M.K. Wiezorek, University of Pittsburgh, DMR-Metals **NSF 0094213**

Effect of cold-work strain & annealing temperature on evolution of microstructure & coercivity established;



Processing/Structure/Property

- Accelerated ordering for ε_{eff}=const. & T_{an} up or T_{an} =const. & ε_{eff} up;
- Equiaxed nanoscale $L1_0$-FePd for supercritical strain (e.g. ε_{eff}~3.3)



H_C(max) ≈ 1400 Oe≈ 6x Hc(PT-FePd), & average grain size **D≈230nm**;

Increased strain → Driving force for CR transformation increases
→ Grain refinement (submicron)
→ Enhanced coercivity

"Magnetic age hardening of cold-deformed bulk equiatomic Fe-Pd intermetallics during isothermal annealing", A.R.Deshpande, J.M.K. Wiezorek, Journal of Magnetism &Magnetic Materials - In press @ http://www.sciencedirect.com/science/journal/03048853

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OUTREACH:

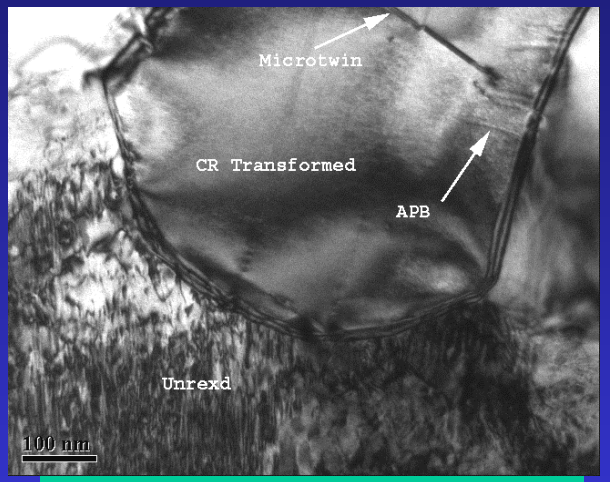
➢ International student exchange program with Materials Physics program of University of Augsburg, Germany;SECOND Iteration
→ Summer 2003: 2 German undergrad's to Pittsburgh.

➢ REU Summer 2003:
→ 1 engineering physics undergraduate recruited for MSE REU through presentation in EngPhys seminar.

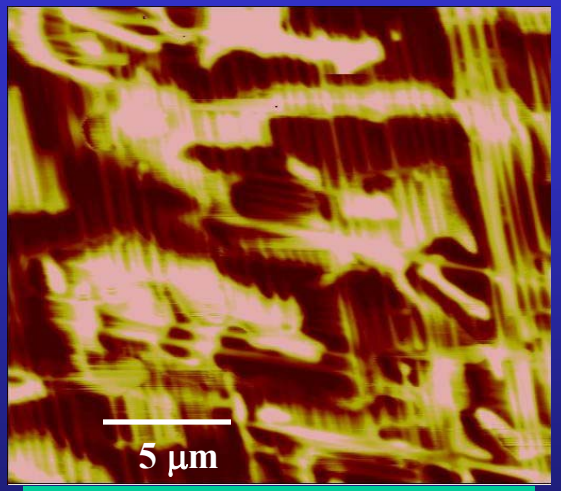
EDUCATIONAL:

1 undergraduate… Paul Ohodnicki (REU-student summer 03)
=> Trained in VSM, AFM/MFM and SEM studies of FePd alloys
=> B.S. Goldwater Fellowship for REU research during summer 02

2 graduate students …
Amal Al-Ghaferi (female from UAE) and
Anirudha Deshpande (male from India)
=> Trained in VSM, DSC, AFM/MFM, TEM, SEM and XRD studies of Fe-Pd alloys



TEM - Recrystallization Front in $L1_0$-ordered FePd



MFM image of FePd showing magnetic domain contrast